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Rural Electrification Administration  
Telephone Engineering and Construction Manual

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APPLICATION GUIDE FOR THE PREPARATION OF  
DETAILED SUBSCRIBER LINE CONCENTRATOR REQUIREMENTS

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1. GENERAL

- 1.1 Purpose

This section provides REA borrowers, consulting engineers, suppliers, and other interested parties with technical information for use in the design and construction of REA borrowers' telephone systems. It discusses, in particular, the application of subscriber line concentrators (SLC).

- 1.2 The discussion that follows has been prepared to assist the borrower or its engineer in the completion of the detailed specification as the basis for an equipment contract.

- 1.3 This section is being issued as a guide to the completion of Part III of REA Form 397g, "Performance Specification for Subscriber Line Concentrators."

- 1.4 Item numbers shown in parentheses refer to items in Part III of REA Form 397g.

2. NUMBER OF SUBSCRIBER LINES

- 2.1 (Items 2.1 through 2.3)

The number of parties per line is shown here. It is recommended that this type of system be used for single-party lines. It is a useful tool for subscriber upgrading and should not be used as a means of prolonging poor service. We recommend that systems using this

device be all single-party, but in no circumstances more than two-party. Beyond two-party, the type of automatic number identification for CAMA operation becomes complicated and difficult to administrate.

## 2.2 (Item 2.4)

The number of pay stations to be accessed are to be designated along with type, either prepay or postpay. The manufacturer of the SLC equipment intended to be used should be consulted before deciding on pay station type. Certain types of equipment may not work with prepay pay stations, for instance. Pay stations are considered a good revenue producing instrument; therefore, they should be served by dedicated plant rather than have to share traffic in a concentrator. If it becomes necessary to put pay stations on SLC's, then the number must be kept to a minimum because of the high priority traffic they produce.

## 2.3 (Item 2.5)

Other types of lines that may be required should be put here. They generally will be a small PABX which may or may not have dedicated trunks in the SLC to the main office. PABX's also should be handled on their own facilities whenever possible and not have their high traffic volume added to a service that restricts traffic. Add an explanation to cover any special applications.

## 2.4 (Item 2.6)

The ultimate number of lines for 10 years, or if it is planned to keep the SLC in service for 20 years, must be shown so that the supplier can determine if his system will meet the ultimate requirements. A growth rate consistent with the area to be served must be shown and it is likely to be different than the overall growth that the host office has experienced.

## 3. LOOP RESISTANCE

3.1 REA transmission objectives must be met on the total loop to all subscribers; this includes the trunk portion (via physical or carrier) plus the loop beyond the concentrator.

### 3.2 (Item 3.1)

3.21 This item is divided into parts "A" and "B" in order to cover the two possibilities for deriving the trunks between the office unit and the remote unit.

3.22 When the trunks between the two units are physical, the entire loop from the subscriber to the central office equipment must be taken into account. All REA central offices since about 1966 have

had 1900 ohm loop limits. The older ones might have loop limits as low as 1200 ohms (see item 6.12 of Part III). As in all switching requirements, these values include the resistance of the telephone set. The loop resistance requiring loop treatment should be shown in this item. If loops between 1200 and 1900 ohms do not require loop treatment, this should be so marked instead of number of lines in this range. Under almost all conditions the 1901 - 3200 and 3201 - 4500 ohm loops will require loop treatment and, therefore, any quantity requirements should be shown in their proper range. The suppliers may determine the portion of each loop beyond his remote unit by referring to item 8.21 of Part III.

3.23 Where carrier is used to derive the trunks between the remote and office units, there are two possible cases. One is that the carrier will face the subscriber loop directly and the loop beyond the remote end will be that of the subscriber carrier. Another possibility is that the carrier will stop at the remote unit and the remote unit will have its own loop limit. In either case, the loop resistance from the remote terminal to the subscriber is the one to be used for completion of this portion. Do not forget that the loop resistances include 200 ohms for the telephone; in other words, 400 to 600 ohms represents 200 to 400 ohms of outside plant plus 200 ohms of telephone since subscriber carrier specifications have always dealt with only the portion of loop resistance included in the cable part of the loop.

### 3.3 (Item 3.2)

These blanks are self-explanatory. The number of pay station lines with outside plant loop limits, excluding the pay station, greater than 1200 ohms for prepay or 1000 ohms for semi-postpay operation, should be indicated. A discussion of the factors involved is provided in REA TE&CM 702, "Pay Station Services." The same rules concerning physical trunks versus carrier derived connecting trunks apply to these loops.

### 3.4 (Item 3.3)

If the purchaser is to supply the range extension equipment, he should closely coordinate his quantities with the seller as the loop limit capabilities of remote units vary widely. Also, if the loop extension devices are to be common moded in connecting physical trunks, the seller will be able to give advice about any range extension devices that are not compatible with his equipment.

## 4. TRAFFIC DATA

### 4.1 (Item 4.1)

This requirement should be determined by measurement as the nature of the area being covered may mean the unit calls per

line will vary widely from the average of the central office to which the SLC is attached. An example would be an SLC which serves a small industrial park. The second best is to use the average of the home office, but under no conditions should the tables given in TE&CM 335, "Application Guide for the Preparation of Detailed Common Control Central Office Equipment Requirements," be used.

#### 4.2 (Item 4.2)

This item should be very carefully thought out. The use of intralinks in a concentrator are expensive and can lead a supplier to furnish a lesser number of trunks than are needed. This percentage should be carefully determined and if the number is in doubt, use zero. The place where this item is useful is in special situations where there is a large quantity of intracalling and intralinks can be used to eliminate a few of the far more expensive trunks between the two units. Certain operations such as busy verification on intracalls are not possible in known systems.

### 5. TYPE OF RINGING

#### 5.1 (Items 5.1 through 5.4)

The type of ringing designated will normally be of the type used in the host central office. These items do not apply where a concentrator uses physical loops or subscriber carrier which regenerates whatever ringing frequency is supplied by the central office. The types of concentrators which have ringing generators in the remote unit will be most affected by this item. If item 5.4 is indicated, the frequency and voltages must be given where it is designated "Explain."

### 6. CENTRAL OFFICE TERMINAL

#### 6.1 (Item 6.1)

Central office equipment to which the SLC will be connected is discussed in this paragraph. The loop limit is particularly important in the trunks between the two SLC units are to be physical. The information in this paragraph is used by the seller to determine if special adapters or options are required on the subscriber line concentrator to be supplied.

#### 6.2 (Item 6.2)

The mounting rack for the central office terminal of the SLC equipment is normally supplied by the seller, but if the purchaser has a spare rack which might be used it should be described here.

## 7. REMOTE TERMINAL

### 7.1 (Item 7.1)

If no building is available at the remote end, the unit must be mounted in a housing furnished by the seller. If a housing other than that supplied by the seller is used, there could be warranty problems concerning the switching equipment. If the equipment is to be mounted in a building, information must be given to the supplier concerning the space available, 60 Hz power available, environmental conditions (heat, humidity, cooling, etc.), and with what products or operation the switching equipment must share the building.

## 8. TRUNK FACILITIES

### 8.1 (Item 8.1)

If the trunk facility is to be carrier derived and the purchaser is to supply it, the pertinent parameters are to be spelled out in this item, especially the loop limit of the subscriber end of the carrier.

### 8.2 (Item 8.2)

If the trunks are physical, then this item indicates the loop limit so that the seller can determine what treatment will be required.

### 8.3 (Item 8.3)

The layout of the loops involved with repeater spacings or loop treatment and also the signaling parameters such as idle state voltages, ringing voltages plus the return loss and insertion loss of physical facilities are important.

## 9. EXPLANATORY NOTES

If there are other items not covered in Part III that could possibly affect the installation, these should be covered in a separate note and added to Part III. These could include such items as a special application of the unit or the fact that the unit may be only temporarily installed at its present location. Be certain to give a detailed explanation of any unusual circumstances.